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NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116			EXAMINER SINGH, HIRDEPAL	
			ART UNIT 2611	PAPER NUMBER
			NOTIFICATION DATE 06/11/2008	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/710,539	<b>Applicant(s)</b> CHO ET AL.	
	<b>Examiner</b> HIRDEPAL SINGH	<b>Art Unit</b> 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☒ Claim(s) 27 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This action is in response to the amendment filed on March 21, 2008. Claims 27-28 are added, now claims 1-28 are pending and have been considered below.

### ***Response to Arguments***

2. Applicant's arguments filed March 21, 2008 have been fully considered but they are not persuasive.

3. Applicant argues that "...none of Awater, Gummadi and Barton discloses the limitation... as recited in the claim 1 (page 8, Remarks)... Gummadi's correlation structure 600 performs correlating a first value from a first period with a second value corresponding to an adjacent period. The applicant points out that though Gummadi discloses this term "adjacent period", Gummadi fails to disclose that adjacent periods comprising both previous periods and after periods (page 9, Remarks)... Note is respectfully made by the applicant that in accordance with the IEEE 802.11 a standard well-known to those skilled in the art, the short sequence in the PLCP preamble precedes the long sequence . Therefore, the period P9 in Gummadi Fig. 6 is prior to the period P10 in Gummadi Fig. 6; on the analogy of this, the period P8 in Gummadi Fig. 6 is prior to the period P9 in Gummadi Fig. 6, and so on... The applicant, therefore, asserts that the combined teaching of Awater, Gummadi and Barton fails to disclose the (claimed) limitation (Page 10, Remarks)."

4. Examiner appreciates Applicant's detailed explanation about the correlation generated based on previous and next symbols, and points out to the section in the

Prior art that refers to the symbol received previous (as pointed out by Applicant above) and next to the symbol i.e. after a symbol for generating correlation. The cited references in combination discloses all the limitations, Gummadi (as admitted in the Remarks page 10 by Applicant) disclose generating correlation between a symbol and a previous symbol i.e. received before that symbol (figures 5-7). Awater discloses that the correlation generation block 304 in figure 5, that includes accumulator 312 accumulates samples of previous and also the next symbols in order to generate the correlation value by the correlation block 304 (see paragraphs 0051-0052).

5. Therefore, Examiner believes that the Prior art of record disclose all the claimed limitations, so the rejection to the claims is upheld.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5-7, 9, 10, 12, 14-16, 18-20, 22, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) and further in view of Barton et al. (US 7,227,834).

#### **Regarding Claims 1 and 14:**

Awater discloses a method and apparatus for detecting a boundary and eliminating the inter symbol and multipath interference in a received stream of sample

values (abstract; paragraph 0054) column 5, lines 12-22; column 6, lines 1-6)  
comprising;

a correlator computing a correlation value between plurality of signals of first symbol and second symbol (figure 5; paragraphs 0037, and 0061), and using two differential correlation values from pair of differential correlators for detecting the signal packets (paragraphs 0040, and 0046-0047) (as clearly stated in claim number 6); computing a correlation value in correlation generation block (304 in figure 5, that includes accumulator 312 accumulates samples of previous and also the next symbols in order to generate the correlation value by the correlation block 304; also see paragraphs 0051-0052); a comparator to determine which one of the correlation value has a higher sum (figure 5; paragraph 0056); and a controller that receives input from the boundary detection blocks and control different functions (figure 4; paragraph 0034).

Awatere discloses all of the subject matter as described above except for specifically teaching that (1) the signals are transmitted via same sub-carriers; and (2) adjusting the timing of boundary according to the comparison result.

However, Regarding item (1) above Gummadi in the same field of endeavor, discloses a similar apparatus and method for boundary detection using multiple correlations, where the received signal is correlated with previous signal and both are transmitted through same channel (column 5, lines 58-67), also the system could be using a multi-carrier or single-carrier technique (column 9, lines 55-65), the correlation value is generated by comparing samples in a period with samples in another/different period (column 6, lines 22-28), furthermore the correlation value is generated by

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comparison of samples of a period with samples in another adjacent period (abstract; column 6, lines 56-67), and a control signal to control the functions of the system (figure 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the same carrier or sub-carrier as taught by Gummadi in Awater system to transmit the signals in order to get same modulation and demodulation for the signals of different symbols, and generate a correlation value by comparing adjacent period samples i.e. a period previous to first one or by comparing a period next to first one in order to see the presence of sequence boundary more rapidly and to make more reliable interference rejection.

Regarding item (2) above, Barton in the same field of endeavor discloses a system and method for synchronizing OFDM signal where the timing of the signal is adjusted to according to the conditions to get synchronization (figures 3-5; column2, lines 30-40; column 3, lines 18-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use adjust the timing of the boundary by using the correlation values generated in Awater as taught by Barton in order to avoid the situation when adjusting the synchronization results in changing signal conditions, the complex values in the frequency bins at the output of the FFT suffer varying degrees of phase rotation, a subsequent channel estimator and corrector can handle these changes, this can

result in a further increase of acquisition time and requires a significant amount of processing power, the signal boundary adjustment takes care of these problems and save the acquisition time and power.

**Regarding Claims 2 and 15:**

Awater discloses all of the subject matter as described above except for specifically teaching that the signals include a plurality of pilot and data signals.

However, Gummadi in the same field of endeavor discloses that the signal packets could be data signals and control signal i.e. pilot signals (column 1, lines 15-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit symbols including plurality of pilot signals and data signals in Awater. One would have been motivated to include plurality of pilot signal and plurality of data signals in the symbols in order to get the real data send with the related control or reference information as well.

**Regarding Claims 3 and 16:**

Awater discloses all of the subject matter as described above, and further discloses that the signal packets comprises sync bits i.e. a pilot signals (paragraph 0037), but doesn't explicitly disclose that the first, second, and third signals are different or not same.

However, Gummadi in the same field of endeavor discloses that the signals of periods are not same or they are different (figures 8a-c; column 8, lines 7-17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit different pilot signals for first, second, and third symbols in Awater. One would have been motivated to include different pilot signal in the symbols in order to get the related control or reference information.

**Regarding Claims 5 and 18:**

Awater discloses all of the subject matter as described above, but doesn't explicitly disclose that first, second, and third signals are data signals.

However, Gummadi in the same field of endeavor discloses that the system is determining boundary between sequences of digital data streams (column 2, lines 1-5; sequences of data is interpreted as the signals are data signals).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit symbols including all data signals as taught by Gummadi in Awater system in order to transmit the required information in the form of data as the all data signals contains more information.

**Regarding Claims 6 and 19:**

Awater discloses all of the subject matter as described above, and further discloses that the signal packets comprises sync bits i.e. pilot signals (paragraph 0037), but doesn't explicitly disclose that the corresponding first, second, and third signals are the same.

However, Gummadi discloses that the signals of periods could be all the same or they are matched (figures 8a; column 8, lines 1-6).



Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit same pilot signals for first, second, and third symbols as taught by Gummadi in Awater system. One would have been motivated to include all the same pilot signals in the symbols in order to get the same timing and control information.

**Regarding Claims 7 and 20:**

Awater discloses all of the subject matter as described above, and further discloses that the first correlator comprises;

- a. a conjugating unit for computing the conjugating value of first data (figures 5, and 7; paragraph 0047);
- b. multiplying unit for multiplying conjugated data with second data for generating product value (figures 5, and 7; paragraph 0047);
- c. correlation value computer generating correlation value according to product value i.e. an adder (figures 5, and 7; paragraph 0047).

**Regarding Claims 9 and 22:**

Awater discloses all of the subject matter as described above, and further discloses that the correlation value is calculated based on square of the absolute value and then the squared values are added in a summation unit (paragraphs 0037, and 0056).

**Regarding Claims 10 and 23:**

Awater discloses all of the subject matter as described above, and further discloses that the second correlator used for generating second correlation value comprises;

a. a conjugating unit for computing the conjugating value of first data (figures 5, and 7; paragraph 0047);

b. multiplying unit for multiplying conjugated data with the adjacent data(third data) for generating product value (figures 5, and 7; paragraph 0047);

c. correlation value computer generating correlation value according to product value i.e. an adder (figures 5, and 7; paragraph 0047).

**Regarding Claims 12 and 25:**

Awater discloses all of the subject matter as described above, and further discloses that the correlation value is calculated based on square of the absolute value and then the squared values are added in a summation unit (paragraphs 0037, and 0056).

8. Claims 8, 11, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) and further in view of Barton et al. (US 7,227,834) as applied to claims 1, 7, 10, 14, 20, and 23 above, and further in view of Narasimhan (US 7,218,691).

**Regarding Claims 8 and 21:**

Awater discloses all of the subject matter as described above and further discloses that the correlation value calculation includes a summation unit or an adder

(figures 5, and 7; paragraph 0047), but doesn't explicitly disclose that the correlation is based on the absolute value of the product.

However, Narasimhan in same field of endeavor discloses a similar method and apparatus for estimating the timing of OFDM symbol by generating a correlation value with comparison of sum of correlation with a prior and a subsequent value (abstract; figure 8; column 2, lines 48-54), and further discloses that the correlation value is generated based on the sum of absolute values (column 2, lines 35-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use an absolute value calculating unit as taught by Narasimhan in Awater system to generate the correlation value in order to quantize the sign bits of the received signal.

**Regarding Claims 11 and 24:**

Awater discloses all of the subject matter as described above and further discloses that the correlation value calculation includes a summation unit or an adder (figures 5, and 7; paragraph 0047), but doesn't explicitly disclose that the correlation is based on the absolute value of the product.

However, Narasimhan in same field of endeavor discloses a similar method and apparatus for estimating the timing of OFDM symbol by generating a correlation value with comparison of sum of correlation with a prior and a subsequent value (abstract; figure 8; column 2, lines 48-54), and further discloses that the correlation value is generated based on the sum of absolute values (column 2, lines 35-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use and absolute value calculating unit as taught by Narasimhan in Awater system to generate the correlation value in order to quantize the sign bits of the received signal.

9. Claims 4, 13,17, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (US 2005/0152317) in view of Gummadi et al. (US 7,136,436) and further in view of Barton et al. (US 7,227,834) as applied to claims 1-3, and 14-16 above, and further in view of Mui (US 6,690,739).

**Regarding Claims 4 and 17:**

Awater disclose all of the subject matter as described above, except for specifically teaching that the value of first, second, and third signals are predetermined.

However, Mui in the same field of endeavor discloses a similar method and system for intersymbol interference compensation, and further discloses that the encoded sequence of symbols is a set of predetermined values (abstract; column 2, lines 5-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the first, second, and third signals with predetermined values in Awater in order to get at the receiver end the predetermined control or reference information.

**Regarding Claims 13 and 26:**

Awater disclose all of the subject matter as described above, except for specifically teaching using an equalizer and a slicer for equalizing and then slicing the second symbol.

However, Mui in the same field of endeavor discloses a similar method and system for intersymbol interference compensation, and further discloses using an equalizer and a slicer in the inter symbol interference compensation decoder (figure 18; column 31, lines 18-57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the equalizer and the slicer in Awater to equalize the second symbol and then slicing the symbol to generate a signal in order to cancel the intersymbol or multipath interferences in the signal. Similarly, one of ordinary skill in the art would use an equalizer and a slicer for the third symbol to generate third signal.

### ***Allowable Subject Matter***

10. Claims 27 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: The Prior art of record Awater et al discloses a system for detecting inter symbol interference by computing first correlation between a first symbol and a previous symbol, and a correlation value between a first symbol and a next symbol or a symbol received after the first symbol and adjusting the timing based on the correlation

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comparison. But, the cited Prior art reference doesn't disclose that adjustment in timing is such that the delaying the timing of the boundary when the first correlation value is greater than the second correlation value, or advancing the timing of the boundary when the second correlation value is greater than the first correlation value.

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIRDEPAL SINGH whose telephone number is (571)270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off)8:00AM-5:00PMEST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. S./

Examiner, Art Unit 2611

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611